Introduction to Multi-Agent-Programming

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Exercise Sheet 6

Due: December 7th, 2010

Exercise 6.1 (Kalman Filter)

The temperature of a victim is measured by three agents (a_1, a_2, a_3). Each of them is equipped with a temperature sensor. The measurements are guided by three independent Gaussian with covariances $(\sigma^2_{a_1}, \sigma^2_{a_2}, \sigma^2_{a_3}) = (1, 2, 3)$.

(a) **Integrate the measurements (1pt)**
The agents get the measurements $(m_{a_1}, m_{a_2}, m_{a_3}) = (34, 30, 40)$. If these measurements are integrated in a Kalman filter, what is the result?

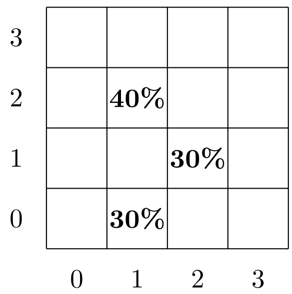
(b) **Explain the results (1pt)**
The temperature of a victim should be 37.5 if one is conscious, or 33.0 if one is unconscious. What is most possible status (conscious?) of the victim, and why?

Exercise 6.2 (Markov Localization)

A robot is moving in the following grid world. Moving into its four neighbors are equally possible. The robot will stay at the same cell if it moves towards a wall. Initially, the robot is at (1, 1) with a probability of 50% and at (1,3) with a probability of 36%, each of the rest cells gets a probability of 1%

3		**36%**		
2				
1		**50%**		
0				
	0	1	2	3

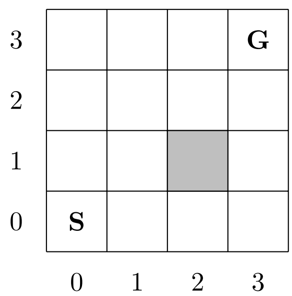
At the next step, the observations are described in probabilities and shown in the following grid.



(a) **If three trajectories are tracked by the KFs, please draw these trajectories on the grid. (1pt)**

Exercise 6.3 (Potential Fields)

A robot moving from S to G in the following grid world. G has an attractive potential with value -5. Cell (2,1) has a repulsive potential with value 3. The potentials are linearly decreasing or increasing along the Manhattan distance.



(a) **Compute the value of potential at each cell. (1pt)**

(b) **Paint the trajectory of the Robot on the grid according to the potentials (1pt)**

This exercise should be submitted during the lecture on Tuesday (Dec. 7th)